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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,492	02/19/2002	Kozo Akiyoshi	13909	9924

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EXAMINER

HESSELTINE, RYAN J

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/076,492

Applicant(s)

AKIYOSHI ET AL.

Examiner

Ryan J Hesseltine

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 11-24 is/are rejected.
- 7) ☒ Claim(s) 6-10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/10/02</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 23 and 24 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 23 and 24 are directed to a computer program executable by a computer. A statutory computer program product with descriptive material must include a positive recitation of the computer readable medium, on which the computer program product is stored or recorded. See MPEP § 2106.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 11-14, 19-22 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinagawa et al. (USPN 6,018,592, cited on applicant's IDS, hereafter Shinagawa).
6. Regarding claims 11 and 24, Shinagawa discloses multivariate space processing method and a computer program executable by a computer, comprising: acquiring a first image and a second image (column 7, line 8-36) by projecting three-dimensional data on a predetermined

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plane (all two-dimensional image capturing devices such as cameras inherently project three-dimensional scenes onto an imaging plane); and computing a matching between the first image and the second image (column 5, line 63-column 6, line 13).

7. Regarding claim 19, Shinagawa discloses a multivariate space processing apparatus, comprising: a conversion unit which acquires a first image and a second image (column 7, line 8-36) by projecting three-dimensional data on a predetermined plane (all two-dimensional image capturing devices such as cameras inherently project three-dimensional scenes onto an imaging plane); and a matching processor which computes a matching between the first image and the second image (column 5, line 63-column 6, line 13).

8. Regarding claims 12 and 20, Shinagawa discloses that the matching is computed pixel by pixel based on correspondence between a critical point detected through a two-dimensional search on the first image and a critical point detected through a two-dimensional search on the second image (column 6, line 15-column 7, line 19).

9. Regarding claims 13 and 21, Shinagawa discloses multiresolutionalizing the first image and the second image by respectively extracting the critical points; performing a pixel-by-pixel matching computation on the first image and the second image at the same multiresolution level (column 6, line 15-column 7, line 19); and acquiring a pixel-by-pixel correspondence relation at a finer level of resolution while inheriting a result of the pixel-by-pixel matching computation from a matching computation at a different multiresolution level (column 10, line 7-50; column 20, line 19-column 21, line 4).

10. Regarding claims 14 and 22, Shinagawa discloses generating an intermediate image of the first image and the second image (column 6, line 10-13) by performing an interpolation

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computation based on a result of said matching computation (column 16, line 45-column 17, line 11; column 23, line 1-49).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-5, 15-18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweatt, III (USPN 5,986,660, newly cited, hereafter Sweatt) in view of Shinagawa.

13. Regarding claims 1 and 23, Sweatt discloses a multivariate space processing method and a computer program executable by a computer, comprising: degenerating (translating) multivariate data (4-dimensional data set 116) into three predetermined variates (3-dimensional perspective data set 114; column 3, line 7-20); determining a reference variate (e.g. time) to serve as a reference among the three variates (column 3, line 51-67); acquiring a first two-dimensional space (image) formed by the remaining two variates (x,y) when the reference variate takes a first value (e.g. time t1); acquiring a second two-dimensional space (image) formed by the remaining two variates (x,y) when the reference variate takes a second value (e.g. time t2; column 2, line 47-67; column 3, line 51-67). Sweat does not disclose computing a matching between the first two-dimensional space and the second two-dimensional space.

14. Shinagawa discloses a multiresolutional critical point filter and image matching using the same including computing a matching between a first two-dimensional space and a second two-dimensional space (column 5, line 63-column 6, line 4; column 7, line 8-31). It would have been

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obvious to one of ordinary skill in the art at the time the invention was made to compute a matching between the first two-dimensional space and the second two-dimensional space as taught by Shinagawa in order to perform completely automated morphing, object recognition, stereo photogrammetry, volume rendering, and smooth generation of motion images from a small number of frames (column 6, line 5-13).

15. Regarding claim 15, Sweatt discloses a multivariate space processing apparatus, comprising: a preprocessing unit which degenerates (translates) multivariate data (4-dimensional data set 116) into three predetermined variates (3-dimensional perspective data set 114; column 3, line 7-20); a conversion unit which determines a reference variate (e.g. time) from among the three variates to serve as a reference (column 3, line 51-67), acquires, as a first image, a two-dimensional space formed by the remaining two variates (x,y) when the reference variate takes a first value (e.g. time t1), and acquires, as a second image, a two-dimensional space formed by the remaining two variates when the reference variate takes a second value (e.g. time t2 column 2, line 47-67; column 3, line 51-67); and a matching processor which computes a matching between the first image and the second image (see above discussion of claims 1 and 23).

16. Regarding claims 2 and 16, Shinagawa discloses that the first and second two-dimensional spaces are regarded as a first image and a second image, respectively, and the matching is computed pixel by pixel based on correspondence between a critical point detected through a two-dimensional search on the first image and a critical point detected through a two-dimensional search on the second image (column 6, line 15-column 7, line 19).

17. Regarding claims 3 and 17, Shinagawa discloses multiresolutionalizing the first image and the second image by respectively extracting the critical points; performing a pixel-by-pixel

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matching computation on the first image and the second image at the same multiresolution level (column 6, line 15-column 7, line 19); and acquiring a pixel-by-pixel correspondence relation at a finer level of resolution while inheriting a result of the pixel-by-pixel matching computation from a matching computation at a different multiresolution level (column 10, line 7-50; column 20, line 19-column 21, line 4).

18. Regarding claims 4 and 18, Shinagawa discloses generating an intermediate two-dimensional space (image) based on the first two-dimensional space (image) and the second two-dimensional space (column 6, line 10-13) by performing an interpolation computation based on a result of said matching computation (column 16, line 45-column 17, line 11; column 23, line 1-49).

19. Regarding claim 5, Shinagawa discloses displaying the intermediate two-dimensional space (column 23, line 41-49).

Allowable Subject Matter

20. Claims 6-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter: claim 6 recites limitations not found in the prior art of record including comparing a virtual intermediate two-dimensional space obtained from the matching computation and an authentic intermediate two-dimensional space obtained based on a predetermined value of the multivariate data.

Conclusion

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22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- USPN 4,998,286 to Tsujiuchi et al. discloses a correlation operation apparatus for multi-dimensional images including means for reducing at least two-dimensional components of the multi-dimensional images.
- USPN 5,275,164 to Maeda et al. discloses a multi-dimensional magnetic resonance imaging method and apparatus including resolving multi-dimensional image data along at least three-dimensional image axes.
- USPN 5,671,344 to Stark discloses a process for displaying N dimensional data in an N-1 dimensional format.
- USPN 6,192,351 to Persaud discloses fuzzy neural networks including mapping or reducing multi-dimensional pattern data into two or three dimensions.
- USPN 6,442,445 to Bunkofske et al. discloses a user configurable multivariate time series reduction tool control method including multi-dimensional reduction to simplify processing.
- USPN 6,654,047 to Iizaka discloses a method and device for acquiring information on a traffic line of persons including compressing multi-dimensional image data into a lower-dimensional feature vector using principal component analysis.
- "Degeneration of complex systems under multifrequent input signal" to Akunova et al. discusses the problem of degeneration of multivariable continuous systems.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069.

The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan J. Hesseltine
February 19, 2005


JINGGEWU
PRIMARY EXAMINER